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The U.S. Army has funded auroral and airglow analysis of the ECOM-721 Extreme Ultraviolet Spectrometer Data. The instrument flew for about 9 months and acquired several hundred thousand extreme and far ultraviolet (EUV and FUV) spectra of the Earth's dayglow.

Some of the important work that was accomplished with the support of this grant include characterization of the EUV and FUV emission features in Aurorae and the polar cap and cusp regions, ionospheric studies using the OII emissions, and the study of geocoronal hydrogen Lyman alpha and beta emissions. The relevant publications and abstracts appear in the final report.

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# CONTINUED ANALYSIS OF ECOM-721 DATA

FINAL REPORT

Dr. Supriya Chakrabarti

20 April 1994

U. S. ARMY RESEARCH OFFICE

Contract DAAG29-85-K-0248

Space Sciences Laboratory
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# Final Report for Army Contract #DAAG29-85-K-0248, Continued Analysis of ECOM 721 Data

During the period between October 1, 1985 and September 30, 1988, the U.S. Army grant, number DAAG29-85-K-0248, has funded auroral and airglow analysis of the ECOM-721 Extreme Ultraviolet Spectrometer Data. The instrument flew for about 9 months and acquired several hundred thousand extreme and far ultraviolet (EUV and FUV) spectra of the Earth's dayglow. Up until 1985, only a very small fraction of the data had been analyzed. The purpose of this grant, is, as the title indicates, the analysis of this large data set. The specific problems that were addressed are listed presently.

## Summary of Important Results

Some of the important work that we accomplished with the support of this grant include characterization of the EUV and FUV emission features in Aurorae and the polar cap and cusp regions, ionospheric studies using the OII emissions, and the study of geocoronal hydrogen Lyman $\alpha$ and $\beta$ emissions. The relevant publications, abstracts as well as the personnel involved are listed in the next sections.

## List of Publications

"Some Auroral Properties from Far Ultraviolet Observations," L. Monchick, M. J. Linevsky, C. I. Meng, S. Favin, S. Chakrabarti, and F. Paresce, *Planet. Space Sci.*, 33, 175–181, 1985.

"EUV (300-900 Å) Spectrum of Polar Cap and Cusp Emissions Near Local Noon," S. Chakrabarti, *J. Geophys. Res.*, 90, 4421–4426, 1985.

"Extreme Ultraviolet Emissions for Monitoring Aurorae in Dark and Daylight Hemispheres," C-I. Meng and S. Chakrabarti, *J. Geophys. Res.*, 90, 4261–4268, 1985.

"$F_2$ Region Ion Densities from Analysis of $O^+$ 834 Å Airglow: A Parametric Study and Comparisons with Satellite Data, R. P. McCoy, D. E. Anderson, Jr., and S. Chakrabarti, *J. Geophys. Res.*, 90, 12257–12264, 1985.

"Extreme and Far Ultraviolet Emissions from the Polar Cap," S. Chakrabarti, *J. Geophys. Res.*, 91, 8065–8072, 1986.

"Imaging the Outflow of Ionospheric Ions into the Magnetosphere," Y. T. Chiu, R. M. Robinson, G. R. Swenson, S. Chakrabarti, and D. S. Evans, *Nature*, 322, 441–444, 1986.

"Modelling of the OI 989 Å to 1173 Å Ratio in the Terrestrial Dayglow," G. R. Gladstone, R. Link, S. Chakrabarti, and J. C. McConnell, *J. Geophys. Res.*, 92, 12445–12450, 1987.

"Atomic Hydrogen and Solar Lyman $\alpha$ Flux Deduced from STP 781 UV Observations," D. E. Anderson, Jr., L. J. Paxton, R. P. McCoy, R. R. Meier, and S. Chakrabarti, *J. Geophys. Res.*, 92, 8759–8766, 1987.

"The OI 3d $^3$D deg $2p^4$ $^3$P Transition at 1026 Å in the Day Airglow," R. R. Meier, D. E. Anderson, Jr., L. J. Paxton, R. P. McCoy, and S. Chakrabarti, *J. Geophys. Res.*, 92, 8767–8773, 1987.

"Ultraviolet Nightglow Production Near the Magnetic Equator by Neutral Particle Precipitation," V. J. Abreu, R. W. Eastes, J. H. Yee, S. C. Solomon, and S. Chakrabarti, *J. Geophys. Res.*, 91, 11365–11368, 1986.

"An Analysis of Satellite Observations of the OI EUV Dayglow," R. Link, S. Chakrabarti, G. R. Gladstone, and J. C. McConnell, *J. Geophys. Res.*, 93, 2693–2714, 1988.

## List of Conference Reports on ECOM-721

"A Parametric Study of Polar Cap Extreme Ultraviolet Emissions", S. Chakrabarti, G.R. Gladstone, R. Link and J.C. McConnell, *EOS*, 66, 319, (1985).

"Theoretical modelling of Polar Cap Extreme Ultraviolet Emissions," S. Chakrabarti, G. R. Gladstone, R. Link and J. C. McConnell, Talk Given at the Fifth Scientific Assembly of the International Assembly of Geomagnetism and Aeronomy, Prague, Czechoslovakia, August 5-17, 1985.

"A Comparison of a Proton and an Electron Aurora in the Extreme Ultraviolet," S. Chakrabarti and T. Sasseen, *EOS*, 66, 1008, 1985.

"Ultraviolet Nightglow Production near the Equator by Neutral Particle Precipitation," R. W. Eastes, V. J. Abreu, J. -H. Yee and S. Chakrabarti, *EOS*, 66, 1008, (1985)

"Imaging ions of Ionospheric Origin in the magnetosphere," Y. T. Chiu, S. Chakrabarti, R. M. Robinson and T. Kwok, *EOS*, 66, 1047, (1985).

"Analysis of Satellite Observations of the OI EUV Dayglow," R. Link, S. Chakrabarti, R. G. Gladstone and J. C. McConnell, *EOS*, 66, 1009, (1985).

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"GBOA Spectroscopy Subcommittee Report on Spectroscopic Remote Sensing of the Upper Atmosphere." A. B. Christensen, G. G. Sivjee, A. L. Broadfoot, S. Chakrabarti, R. L Gattinger and M. R. Torr, *EOS*, 66, 990, (1985).

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"The Extreme and Far Ultraviolet Environment at Shuttle Altitudes", S. Chakrabarti, Invited Talk Given at the COSPAR meeting in Toulouse, France, June-July (1986).

"Imaging of Ionospheric Plasma Outflow in the magnetosphere", S. Chakrabarti, Y.T. Chiu, R.M. robinson, G.R. Swenson, and D.S. Evans, Talk given at the COSPAR meeting in Toulouse, France, June-July, (1986).

"A Reexamination of Rocket Measurements of the OI and $N_2$ EUV Airglow", S. Chakrabarti, G. R. Gladstone, R. Link, and J, C. McConnell, *EOS*, 67, 1130, (1986).

"Analysis of the OI 989 and 1173 Å Airglow Emissions", G. R. Gladstone, R. Link, J. C. McConnell, and S. Chakrabarti, *EOS*, 67, 1130, (1986).

"Are Photoelectron Fluxes Consistent with UV Airglow Measurements?", R. Link, G. R. Gladstone, S. Chakrabarti, and J. C. McConnell, *EOS*, 68, 369, (1987).

"A Self-Consistent Analysis of the HeI (537 Å ,584 Å ) and O II (538 Å 539 Å, 617 Å, 834 Å) EUV Airglow from STP78-1 Satellite Measurements", D. D, Cleary, R. P. McCoy, L. K. Harada, and S. Chakrabarti, *EOS*, 68, 373, (1987).

"Observations of the Aurora in the Extreme and Far Ultraviolet", Invited Talk given at the IAGA meeting, Vancouver, British Columbia, August 10-21, 1987.

"Ionospheric and Atmospheric Remote Sensing using Passive Sensors", S. Chakrabarti, *Talk given at the International Symposium on the Technologies for Optoelectronics*, Cannes, France, November 16-20, 1987.

"An Analysis of the OII 834 Å Dayglow", D. M. Cotton, R. Link, G. R. Gladstone, and S. Chakrabarti, *EOS*, 68, 1397, 1987.

"UV Resonance Line dayglow Emissions on Earth and Jupiter", G. R. Gladstone, T. E. Skinner, J. C. McConnell, R. Link, and S. Chakrabarti, *EOS*, 68, 1392, 1987.

# List of Participating Scientific Personnel

Below is a list of all the scientific personnel that contributed to the work described above. Also listed is each persons current institution. Note, however, that the majority of their work on this grant was performed at the University of California at Berkeley.

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